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C23C 14/14

(21)Application number : 61-133802

(71)Applicant : NIPPON MINING CO LTD

(22)Date of filing : 11.06.1986

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HOSAKA KOJI

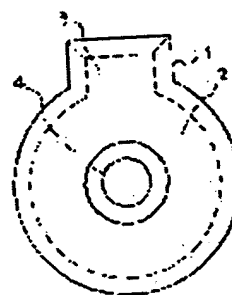
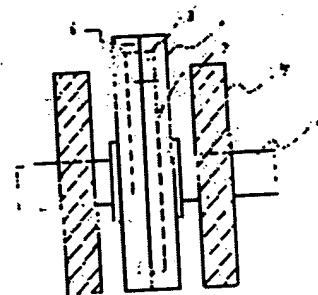
YAEGASHI SEIJI

(54) HIGH PURITY METALLIC TANTALUM TARGET AND ITS PRODUCTION

(57)Abstract:

PURPOSE: To obtain the titled target contg. extremely reduced amounts of alkali metals, radioactive elements, transition metals and high m.p. metals by crystallizing a Ta compound by fractional crystallization, reducing the resulting crystals to form high purity Ta powder, sintering and melting the powder, forming a metallic Ta ingot and working it.

CONSTITUTION: Metallic Ta or Ta₂O₅ is dissolved in hydrofluoric acid or a mixed acid contg. hydrofluoric acid to prepare an aqueous soln. contg. Ta, an aqueous soln. contg. K ions is added and K₂TaF₇ crystals are deposited to remove radioactive elements and high m.p. metals. The crystals are recovered and reduced with Na to form metallic Ta powder and a product contg. KF and NaF. The Ta powder is recovered by washing, compacted, sintered and melted to remove alkali metals and transition metals. The molten metal is formed into an ingot and the resulting metallic Ta ingot is worked to a desired shape. Thus, the titled target contg. ≤50ppb alkali metals, ≤5ppb radioactive elements, ≤3ppm transition metals and ≤3ppm high m.p. metals can be obtd.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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**TARGET MADE OF HIGHLY PURE METALLIC TANTALUM AND
PROCESS FOR ITS PRODUCTION**

Patent Number: ☐ WO8707650
Publication date: 1987-12-17
Inventor(s): KYONO IWAO (JP); HOSAKA HIROSHI (JP); YAEHASHI SEIJI (JP)
Applicant(s): NIPPON MINING CO (JP)
Requested Patent: ☐ JP62297463
Application Number: WO1987JP00365 19870609
Priority Number(s): JP19860133802 19860611
IPC Classification: C23C14/34
EC Classification: C01G35/00, C01G35/00D, C22B34/24, C23C14/34B2
Equivalents: ☐ DE3790259T, JP1905648C, JP6021346B
Cited patent(s): JP58032010; JP49056810; JP60145304

Abstract

A target made of highly pure metallic tantalum having only extremely reduced amounts of alkali metals, radioactive elements, transition metals, and high-melting metals harmful for semiconductor devices. The target contains up to 50 ppb (0.05 ppm) of alkali metals, up to 5 ppb (0.005 ppm) of radioactive elements, up to 3 ppm of transition metals, and up to 3 ppm of high-melting metals. A process for producing the target is also disclosed. It comprises a combination of a wet purifying step mainly involving precipitation of potassium fluorotantalate (K₂TaF₇) crystals and sodium reduction and a subsequent drying step. Sputtering using this target enables production of a high-quality Ta₂O₅ insulating film and a metallic Ta electrode film.

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INTERNATIONAL SEARCH REPORT

International Application No PCT/JP87/00365

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
<div style="display: flex; justify-content: space-between; font-size: 1.2em;"> Int.Cl⁴ C23C14/34 </div>		
II. FIELDS SEARCHED		
Minimum Documentation Searched *		
Classification System	Classification Symbols	
IPC	C23C14/00-14/56	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched *		
<div style="display: flex; justify-content: space-between;"> <div> Jitsuyo Shinan Koho Kokai Jitsuyo Shinan Koho </div> <div> 1926 - 1987 1971 - 1987 </div> </div>		
III. DOCUMENTS CONSIDERED TO BE RELEVANT 14		
Category *	Citation of Document, 16 with indication, where appropriate, of the relevant passages 17	Relevant to Claim No. 18
A	JP, A, 58-32010 (Fujitsu Ltd.) 24 February 1983 (24. 02. 83) (Family: none)	1-2, 7
A	JP, A, 49-56810 (Ulvac Corporation) 3 June 1974 (03. 06. 74) (Family: none)	1-2, 7-9
A	JP, A, 60-145304 (Showa Cabot Super Metel Kabushiki Kaisha) 31 July 1985 (31. 07. 85) (Family: none)	3-6
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: 16</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"a" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search 3		Date of Mailing of this International Search Report 3
August 5, 1987 (05. 08. 87)		August 24, 1987 (24. 08. 87)
International Searching Authority 1		Signature of Authorized Officer 20
Japanese Patent Office		

I. 発明の属する分野の分類			
国際特許分類 (IPC) Int. Cl. C23C14/34			
II. 国際調査を行った分野			
調査を行った最小限資料			
分類体系	分類記号		
IPC	C23C14/00-14/56		
最小限資料以外の資料で調査を行ったもの			
日本国実用新案公報		1926-1987年	
日本国公開実用新案公報		1971-1987年	
III. 関連する技術に関する文献			
引用文献の カテゴリー	引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示		請求の範囲の番号
A	JP, A, 58-32010 (富士通株式会社) 24. 2月. 1983 (24. 02. 83) (ファミリーなし)		1-2, 7
A	JP, A, 49-56810 (日本真空技術株式会社) 3. 6月. 1974 (03. 06. 74) (ファミリーなし)		1-2, 7-9
A	JP, A, 60-145304 (昭和キャボットスーパーメタル株式会社) 31. 7月. 1985 (31. 07. 85) (ファミリーなし)		3-6
<p>※引用文献のカテゴリー</p> <p>「A」 特に関連のある文献ではなく、一般的技術水準を示すもの</p> <p>「E」 先行文献ではあるが、国際出願日以後に公表されたもの</p> <p>「L」 優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献 (理由を付す)</p> <p>「O」 口頭による開示、使用、展示等に言及する文献</p> <p>「P」 国際出願日前で、かつ優先権の主張の基礎となる出願の日の後に公表された文献</p> <p>「T」 国際出願日又は優先日の後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの</p> <p>「X」 特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの</p> <p>「Y」 特に関連のある文献であって、当該文献と他の1以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの</p> <p>「&」 同一パテントファミリーの文献</p>			
IV. 証			
国際調査を完了した日 05. 08. 87		国際調査報告の発送日 24.08.87	
国際調査機関 日本国特許庁 (ISA/JP)		権限のある職員 特許庁審査官 山 田 充	4 K 6 7 9 3

1/5/1

DIALOG(R)File 345:Inpadoc/Fam.& Legal Stat
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5597660

Basic Patent (No,Kind,Date): JP 61133802 A2 860621 <No. of Patents: 001>

PATENT FAMILY:

JAPAN (JP)

Patent (No,Kind,Date): JP 61133802 A2 860621
MEASUREMENT DEVICE FOR CENTERING OF ROTARY SHAFT (English)
Patent Assignee: TOKYO SHIBAURA ELECTRIC CO
Author (Inventor): SATO FUMIHIRO; TAKETAKA HIROMI
Priority (No,Kind,Date): JP 84255602 A 841205
Applic (No,Kind,Date): JP 84255602 A 841205
IPC: * G01B-005/00; G01B-005/25
Language of Document: Japanese

? s an=JP 61133802

S2 0 AN=JP 61133802

? s an=JP 61133802

S3 0 AN=JP 61133802

? s an=JP6113802

S4 0 AN=JP6113802

? s an=de 3790259/PR

S5 0 AN=DE 3790259/PR

? s an=de 3790259

S6 1 AN=DE 3790259

? t s6/5/all

6/5/1

DIALOG(R)File 345:Inpadoc/Fam.& Legal Stat
(c) 2002 EPO. All rts. reserv..

8016757

Basic Patent (No,Kind,Date): WO 8707650 A1 871217 <No. of Patents: 005>

PATENT FAMILY:

GERMANY (DE)

Patent (No,Kind,Date): DE 3790259 C2 900208
HOCHREINES METALLISCHES TANTALTARGET UND VERFAHREN ZU SEINER
HERSTELLUNG (German)
Patent Assignee: NIPPON MINING CO (JP)
Author (Inventor): KYONO IWAO (JP); HOSAKA HIROSHI (JP); YAEGASHI
SEIJI (JP)
Priority (No,Kind,Date): WO 87JP365 W 870609; JP 86133802 A
860611
Applic (No,Kind,Date): DE 3790259 A 870609
Filing Details: DE C2 D2 Grant of a patent after examination process
IPC: * C22B-034/24; C23C-014/08; C23C-014/34; H01L-021/316
CA Abstract No: * 108(16)136233J
Derwent WPI Acc No: * C 87-362737
Language of Document: German

Patent (No,Kind,Date): DE 3790259 T 880623

HOCHREINES METALLISCHES TANTALTARGET UND VERFAHREN ZU SEINER
HERSTELLUNG (German)

Patent Assignee: NIPPON MINING CO (JP)

Author (Inventor): KYONO IWAO (JP); HOSAKA HIROSHI (JP); YAEGASHI
SEIJI (JP)

Priority (No,Kind,Date): WO 87JP365 W 870609; JP 86133802 A
860611

Applic (No,Kind,Date): DE 3790259 A 870609
IPC: * C23C-014/14; C23C-014/34; C23C-014/08; C22B-034/20;
H01L-021/316; C23C-014/30; H01L-021/283
CA Abstract No: * 108(16)136233J
Derwent WPI Acc No: * C 87-362737
Language of Document: German

JAPAN (JP)

Patent (No,Kind,Date): JP 62297463 A2 871224
HIGH PURITY METALLIC TANTALUM TARGET AND ITS PRODUCTION (English)
Patent Assignee: NIPPON MINING CO
Author (Inventor): KYONO IWAO; HOSAKA KOJI; YAEGASHI SEIJI
Priority (No,Kind,Date): JP 86133802 A 860611
Applic (No,Kind,Date): JP 86133802 A 860611
IPC: * C23C-014/34; B22F-009/20; C22C-001/04; C22C-027/02; C23C-014/14
Language of Document: Japanese
Patent (No,Kind,Date): JP 94021346 B4 940323
Patent Assignee: JAPAN ENAJII KK
Author (Inventor): KYONO IWAO; HOSAKA KOJI; YAEGASHI SEIJI
Priority (No,Kind,Date): JP 86133802 A 860611
Applic (No,Kind,Date): JP 86133802 A 860611
IPC: * C23C-014/14; B22F-009/20; C23C-014/34
Language of Document: Japanese

WORLD INTELLECTUAL PROPERTY ORGANIZATION, PCT (WO)

Patent (No,Kind,Date): WO 8707650 A1 871217
TARGET MADE OF HIGHLY PURE METALLIC TANTALUM AND PROCESS FOR ITS
PRODUCTION (English)
Patent Assignee: NIPPON MINING CO (JP)
Author (Inventor): KYONO IWAO (JP); HOSAKA HIROSHI (JP); YAEGASHI
SEIJI (JP)
Priority (No,Kind,Date): JP 86133802 A 860611
Applic (No,Kind,Date): WO.87JP365 A 870609
Designated States: (National) DE; US
Filing Details: WO 10000 With international search report
IPC: * C23C-014/34
CA Abstract No: ; 108(16)136233J
Derwent WPI Acc No: ; C 87-362737
Language of Document: Japanese

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